

Factor: $3x^2 + 7x + 2$ $a \neq 1$

$(3x+1)(x+2)$

3.8(4.4) Factoring Complex Trinomials ($ax^2 + bx + c$, $a \neq 1$)

Expand $(x + 4)(2x + 3)$. What are the x-terms?

$$(x + 4)(2x + 3) = 2x^2 + 3x + 8x + 12$$

$$= 2x^2 + 11x + 12$$

To factor $2x^2 + 11x + 12$, we need to do these steps in reverse order.

How do the numbers 3 and 8 relate to 2, 11, and 12?

$$3 + 8 = 11$$

$$3 \times 8 = 2 \times 12$$

⇒ Multiple the 1st and 3rd

Once you have broken the middle term, you can factor by grouping

$$= 2x^2 + 11x + 12$$

$$= 2x^2 + 3x + 8x + 12$$

$$= x(2x+3) + 4(2x+3)$$

$$= (x+4)(2x+3)$$

$$\begin{array}{r} 24 \\ \hline \cancel{1 \times 24} \\ \cancel{2 \times 12} \\ \boxed{3 \times 8} \\ \cancel{4 \times 6} \\ \hline \underline{3} + \underline{8} = +11 \end{array}$$

Ex. Factor $6m^2 + 13m - 5$

Numbers multiply to: -30 (product)

Numbers add to: 13 (sum)

Numbers are:

15 and -2 (integers)

This technique is called SPI
(sum, product, integers)

MAN

$$\begin{array}{r} -30 \\ \hline \cancel{1 \times 30} \\ \boxed{2 \times 15} \\ \cancel{3 \times 10} \\ \hline \underline{-2} + \underline{15} = +13 \end{array}$$

Ex. Factor $6m^2 + 13m - 5$

Numbers are: -2 and 15

Now factor by grouping:

$$6m^2 + 13m - 5 =$$

$$= 6m^2 - 2m + 15m - 5$$

$$= 2m(3m - 1) + 5(3m - 1)$$

$$= (2m + 5)(3m - 1)$$

Ex. Factor: $6x^2 - 13x + 6$

$$= 6x^2 - 9x - 4x + 6$$

$$= 3x(2x - 3) - 2(2x - 3)$$

$$= (3x - 2)(2x - 3)$$

$$\begin{array}{r} 36 \\ \hline \cancel{1 \times 36} \\ \cancel{2 \times 18} \\ \cancel{3 \times 12} \\ 4 \times 9 \end{array}$$

$$-4 + -9 = -13$$

$$\begin{aligned} &= 6x^2 - 4x - 9x + 6 \\ &= 2x(3x - 2) - 3(3x - 2) \end{aligned}$$

Ex. Factor: $10x^2 - 11x - 6$

$$= 10x^2 - 15x + 4x - 6$$

$$= 5x(2x-3) + 2(2x-3)$$

$$= (5x+2)(2x-3)$$

$$\frac{-60}{-}$$

~~1×60~~

~~2×30~~

~~3×20~~

$$4 \times 15$$

~~5×12~~

$$-15 + 4 = -11$$

Ex. Factor: $4x^2 - 5xy - 6y^2$

$$= 4x^2 - 8xy + 3xy - 6y^2$$

$$= 4x(x-2y) + 3y(x-2y)$$

$$= (4x+3y)(x-2y)$$

$$\frac{-24}{-}$$

~~1×24~~

~~2×12~~

$$3 \times 8$$

~~4×6~~

$$-8 + 3 = -5$$

Assigned Work:

p.223-224 #3bc, 5abc, 6,

#7abc, 11, 15, 17(Challenging)

Look for common factors first!!!